EXHIBIT A

Cyclic voltammetry was used to monitor the reduction potential of these four compounds. The cyclic voltammograms are shown if Figure 4.7. Tertiary amines undergo two oxidations as shown in equations 4.2 and 4.3, using TPA as an example, with the second oxidation being irreversible.

$$Pr_3N - e^- \longrightarrow Pr_3N^{\bullet+} \longrightarrow Pr_2\dot{N}CHEt + H \qquad 4.2$$

$$Pr_2\dot{N}CHEt - e^- \longrightarrow Pr_2N^+{=}CHEt \qquad 4.3$$

The expanded view in Figure 4.7 shows the first oxidation of TPA starting at a potential lower that 0V, TEA at approximately 0V, and TEOA around 0.25V vs. Ag/AgCl. These three molecules would yield a high dark current when working in a potential range of 0.25V to 0.65V. EDTA oxidation starts at 0.75V, which allows it to retain a low dark current up to this, potential. Figure 4.8 demonstrates this improvement in dark current by comparing TEOA and EDTA. The potential was held at 0.5V vs. Ag/AgCl with the modified electrode of dsDNA – 10nm Au colloid – $[Ru(bpy)_3]^{2+}$. The dark current of the TEOA is ~750nA after 25 seconds while that of EDTA falls to less than 100nA within the first second. EDTA was used as the sacrificial electron donor in the following experiments.